MORPHOLOGY OF SOME FERNS GROWING IN SEINLONE MOUNTAIN AREA ,KACHIN STATE

Nu Nu Htwe[1] , Soe Myint Aye[2]

Abstract

The taxonomic study on Ferns and Fern allies in Seinlone mountain area of Momauk Township has been undertaken. The study area is situated between North Latitude 24° 13' and 24° 14' and East Longitude 97° 23' and 97°26'. Five species belonging Ferns and two species of Fern Allies are included. The study area is mostly covered with evergreen forest and most of the ferns are found as epiphytes on the trunk of tree. *Selaginella* sp., *Lygodium* sp. and *Pteridium* sp. are found as mostly distributed species on the ground, and *Ceratopteris thalictroides* is found as semi-aquatic species.*Lycopodiella cernua* that can be used as ornamental plant which is usually distributed in study area. All the collected species are fully described with figures of photographs. Artificial key to the species of all the collected plants are also given.

Key Words: Ferns, taxonomy.

INTRODUCTION

The present research deals with taxonomic study on Ferns growing in Seinlone mountain range, Southern Kachin State of Myanmar.Seinlone area lies between the 97° 29' and 97° 30' east longitude and between 24° 14' and 24° 13' north latitude and 6052 feet in elevation. This area is belonged to Momauk Township of Bamaw District. Seinlone area consists of 10 village tracts and estimation of the area is about 39 square miles. Seinlone area is continuous with Waimaw Township at the north and Bamaw Township at the West. It also shares the common border with China about 60 miles at the east. The nearest town is Momauk that is situated at 26 miles away from Seinlone.

The study area is located at the foothill of Sino-Himalaya mountain ranges. The whole area is mountainous most of the mountains align from North to South. In this region, the higher peak of Sein Lone is 5660 feet above sea level, Law Dan as high as 3330 feet, Kyauk Sa Kan (stone village) situated at the elevation of 450 feet. The distinct feature of study area is stone village waterfall resort. The waterfall takes their sources at mountain ranges. The Mountain ranges are continuous with Than Lwin watershed of Sino-Himalaya. Seinlone is the lowest part of Sino-Himalaya mountain range. The colder months for Seinlone are December to January with an average temperature being 2˚- 8˚C. The hottest months are May to July with an average temperature ranging from 20˚- 25˚C. This area is also included in one of the richest places in Kachin state according to the possession of large species of flora and fauna.

In this floristic area, members of the families *Dennstaed-tiaceae, Polypodiaceae* and *Schizaceae* are found to be locally abundant.At the intermediate altitudes, the members of *Lycopodiaceae*, *Selaginellaceae* and *Ceratopteridaceae* are present as the typical of moist evergreen forest.

Dickason (1937) recorded 74 genera and 420 species of ferns in Burma (Myanmar). In (1993), Toe Toe studied 34 genera and 46 species of ferns and fern allies from Katha and Indaw Township in Myanmar. Cho Cho Myint (1995) studied 19 species belonging to 13 genera of ferns and fern allies from Ye Township in Mon State. In (2007), Twe Twe Aye studied 71 species belonging to 38 genera of ferns and fern allies from Lashio and Kyaukme Township of Myanmar.Thin Yu Khaing (2007)

[1] Lecture, Department of Botany, West Yangon University

[2]Deputy Director-General, Department of Higher Education, Naypyidaw

recorded 28 genera and 44 species of ferns flora and communities in Yangon Division.Thet Yu Nwe(2009) studied 68 species belonging to 46 genera of ferns and its identification in Kaikhtiyoe wildlife Sanctuary.

Seinlone mountain range is covering with the various species of ferns that mostly differ from other regions of Myanmar. Due to the lack of botanical survey on ferns of Seinlone mountain range,.it is a very unique and remote area at the southern part of Myanmar This research is conducted to provide a reliable information and practical field guide on this area to ferns enthusiasts and the students of Botany. The other objectives of the study are to inform the communities to promote the public awareness of the vegetation and to promote environmental values.

The main aim of this research is to identify and classify the ferns of Seinlone. To record their distribution and morphological characteristics, to get the inventory of fern and fern allies found in SeinLone mountain range, and the main objective is to partially accomplish the flora and ferns and fern allies in Myanmar.

MATERIALS AND METHODS

Ferns and fern allies were collected from Seinlone mountain area of Momauk Tsp. including Seinlone village, the specimens were collected monthly throughout the year in (2013). The members of terrestrial and semi-aquatic species were obtained. Plant collection & preservation technique was used to make herbarium specimens. Methods of specimens preparation and preservation followed Pandey (2007).The specimen collections were done every month. The habitats and locations of specimens were determined by using Global Position System (GPS) Device.

The literature that had been used for identification was referred to Hooker (1862), Noteboom (1959), Holttum (1960), Bonkerd and Pollawatn (2000), and Winter and Amoroso (2003). The valid scientific names had been used by checking in index of international plant name. The classing systems and arrangement followed Zender (2000) and Smith *et al*. (2006).

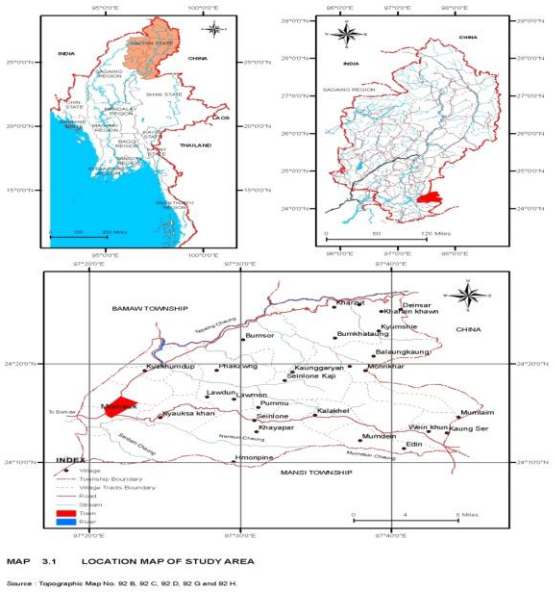

Figure 1. Location Map of the Seinlone Mountain Area

The specimens mounted together with a label of field data on herbarium sheets will be deposited at the Herbarium of Mandalay University for references and other scientific studies. The nomenclatural data referred to the International Plant Name Index.

RESULTS

The present study deals with 7 species of ferns and fern allies. As a result of collection 7 species belong to 6 genera & 5 families. They had been collected from between Momauk and Seinlone.

Table 1. List of collected species

Order	Family	Species
• Lycopodiales	1. Lycopodiaceae	1. *Lycopodiella cernua* (L.)Pic.
	2. Selaginellaceae	2. *Selaginella plana* (Desv.) Hieron.
• Pteridales	3. Dennstaedtiaceae	3. *Microlepia strigosa* (Thumb.)Presl.
		4. *Pteridium aquilinum* (L.) Deck.
	4. Schizaceae	5. *Lygodium microphyllum* (Cav.)R.Br.
		6. *Lygodium salcifolium* C. Presl.
	5. Ceratopteridaceae	7. *Ceratopteris thalictroides* (L.)Brongn.

An Artificial Key to the Studied Speciaes

1. Reproductive organs strobilus
……..…….2.
1. Reproductive organs
sorus……...……..3.
2. Ramenta present; fronds monomorphic ……1. *Lycopodiella cernua*
2. Romenta absent; fronds dimorphic……2. *Selaginella plana*
3. Plants climbing
……4.
3. Plants erect ……5.
4. Fronds monomorphic: annulus 12-celled……5. *Lygodium microphyllum*
4. Fronds dimorphic: annulus 15-celled……..6. *Lygodium salcifolium*
5. Ferns terrestrial
……6.
5. Ferns aquatic or semi-aquatic……7. *Ceratopteris thalictroides*
6.Ramenta setose; spores about 6µ , pale brown……3. *Microlepia strigosa*
6.Ramenta linear-lanceolate; spores about 20µ , golden brown.....4.*Pteridium aquilinum*

Outstanding Characters of Collected Species

1. *Lycopodiella cernua* (L.)Pic.

Terrestrial fern allies, strobili 1-2 sessile, pendent, megasporangia subglobose, annuli mostly 13- celled,microspores globose, yellowish- white.

2.*Selaginella plana*(Desv.) Hieron.

Terrestrial fern allies, strobili terminal, tetragonous,sporangium stalked of 2 kinds:Mega and Micro.

3.Microlepia strigosa (Thumb.)Presl.

Terrestrial ferns, fronds monomorphic,bipinnate or tripinnate;induasia rather broadly cup-shaped, sporaingia stalked, annuli mostly 17-celled, Spores triangular, paled-brown.

4.*Pteridium aquilinum* (L.) Deck.

Terrestrial,fronds monomorphic, tripinnate, quadri-pinnatifid,Sori linear, submarginal,and continuous along the pinna edges,Sporangia stalked annuli mostly 18-celled, Spores subtriangular,golden-brown.

5. *Lygodium microphyllum* (Cav.)R.Br.

Terrestrisl fern, climbing and covering over the vegetation, Sori borne on sorophore, sporangia sessile, annuli mostly 12-celled, spores faintly granulose.

6. *Lygodium salcifolium* C. Presl.

Terrestrial fern, Sori borne on sorophore at each which about 18 sporangia, Sporangia sessile, annuli mostly 15-celled,spores tetrahedral,yellow.

7. *Ceratopteris thalictroides* (L.)Brongn.

Common aquatic or semi-aquatic fern, frond dimorphic, 2-3 pinnate to pinnatisect, Sori scattered throughout the infolded pinnules,Sporangia large, sessile, annuli mostly 32-celled,Spores tetrahedral, with raise superficial lines forming network, pale-yellow.

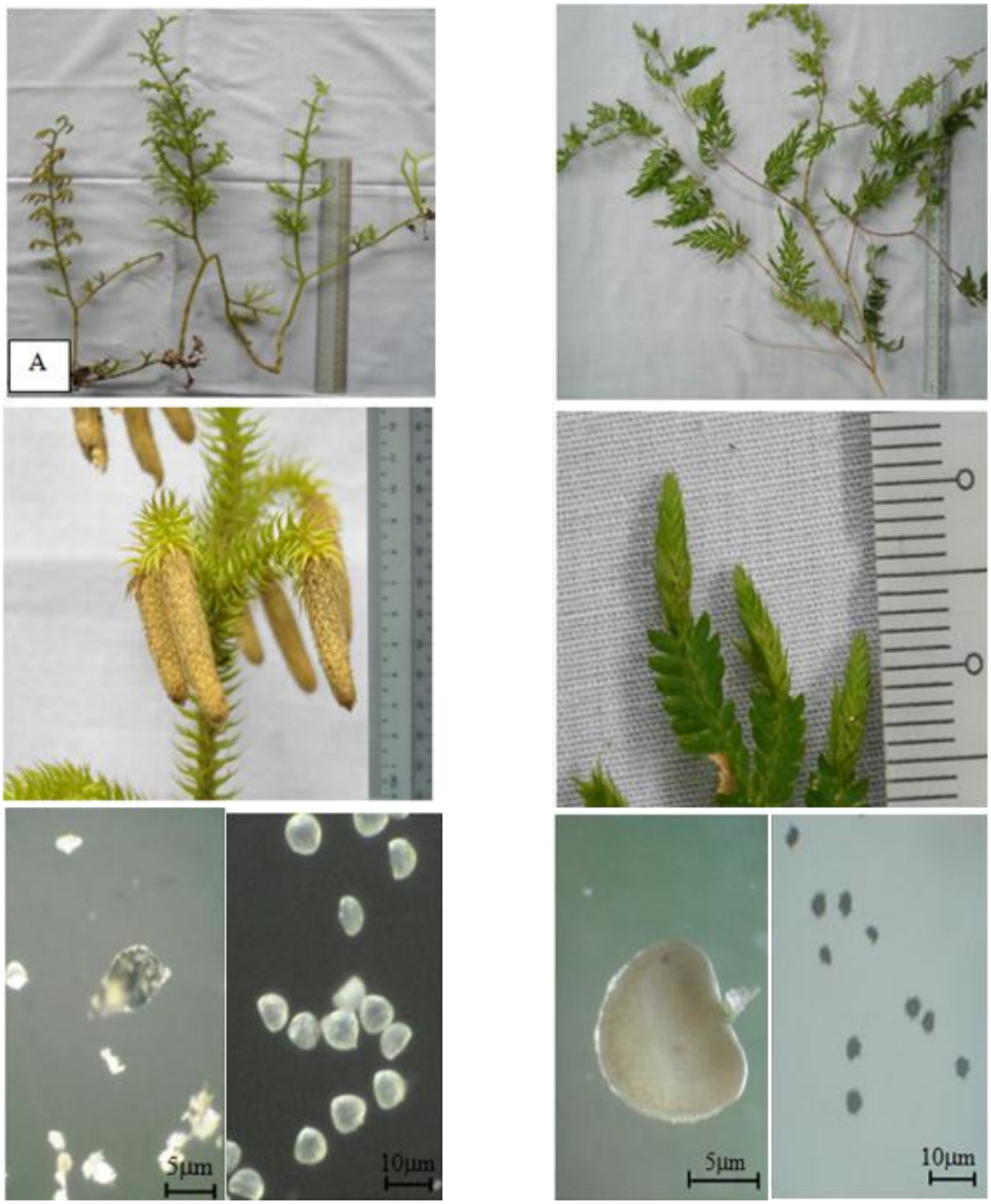

Figure 2. **A**. Habit, **B**. Frond with Strobilus, **C**. Megaspore, **D**. Microspore of *Lycopodiella cernua* (L.)Pic.

Figure 3. **E**.Habit, **F**. Frond with Strobilus, **G**. Megaspore, **H**. Microspore of *Selaginella plana*(Desv.)Hieron.

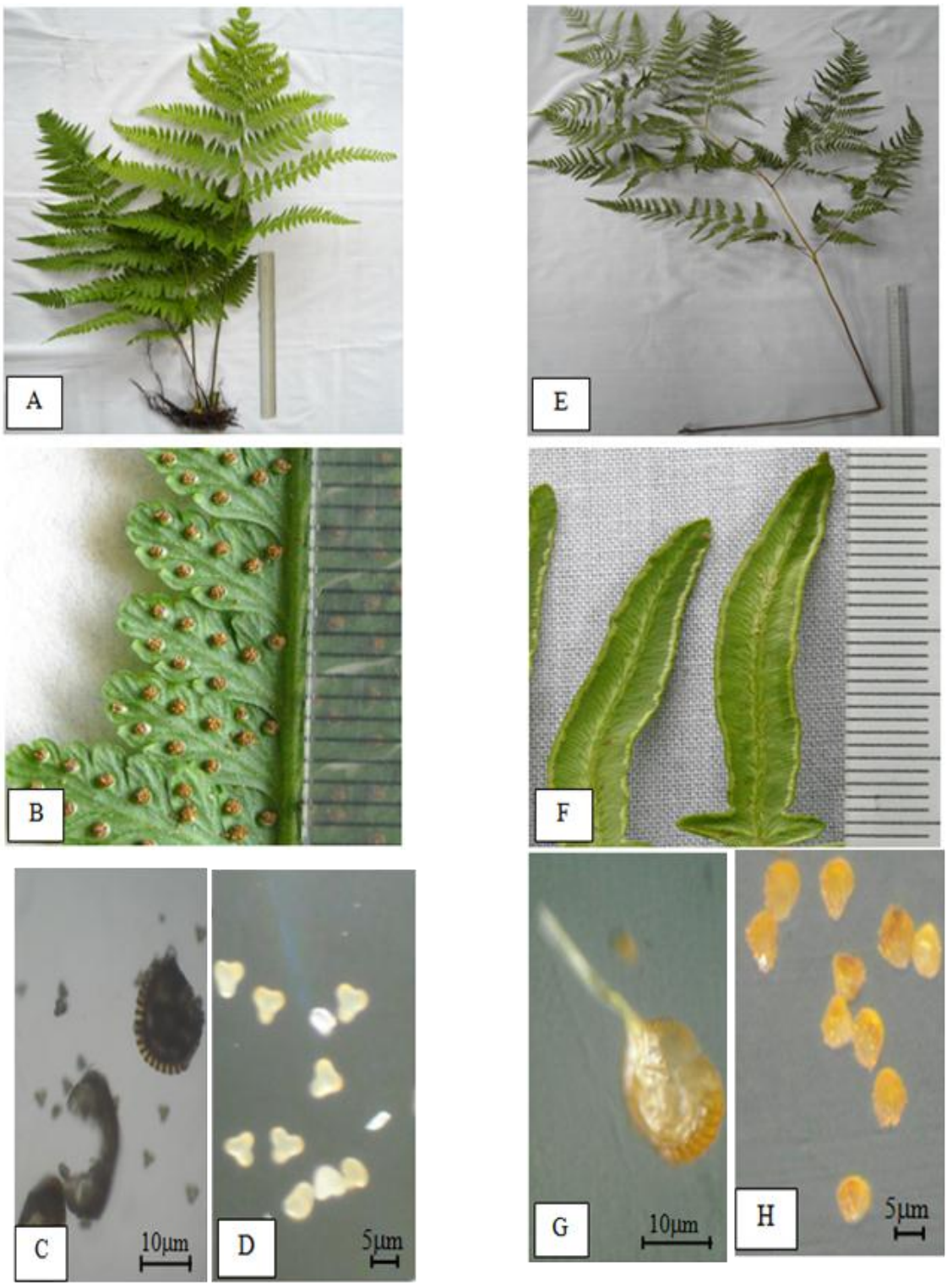

Figure 4. **A**. Habit, **B**. Frond with Sori, **C**. Sporangium, **D**. Spore of *Microlepia strigosa* (Thumb.)Presl.

Figure 5. **E**. Habit, **F**. Frond with Sori, **G**. Sporangium, **H**. Spore of *Pteridium aquilinum* (L.) Deck.

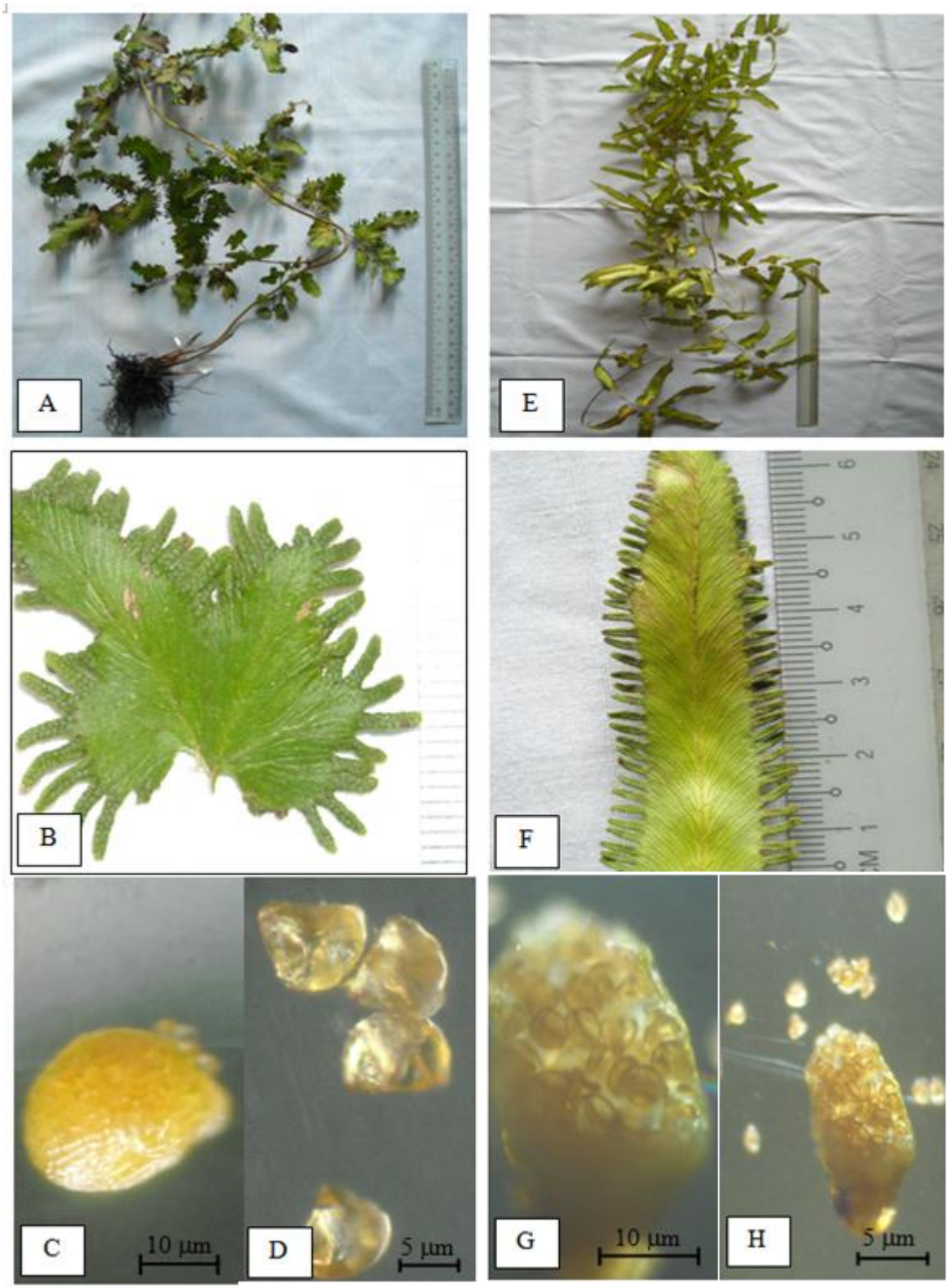

Figure 6. **A**. Habit, **B**. Frond with Sori, **C**. Sporangium, **D**. Spore of *Lygodium microphyllum* (Cav.)R.Br.
Figure 7. **E**. Habit, **F**. Frond with Sori, **G**. Sporangium, **H**. Spore of *Lygodium salcifolium* C. Presl.

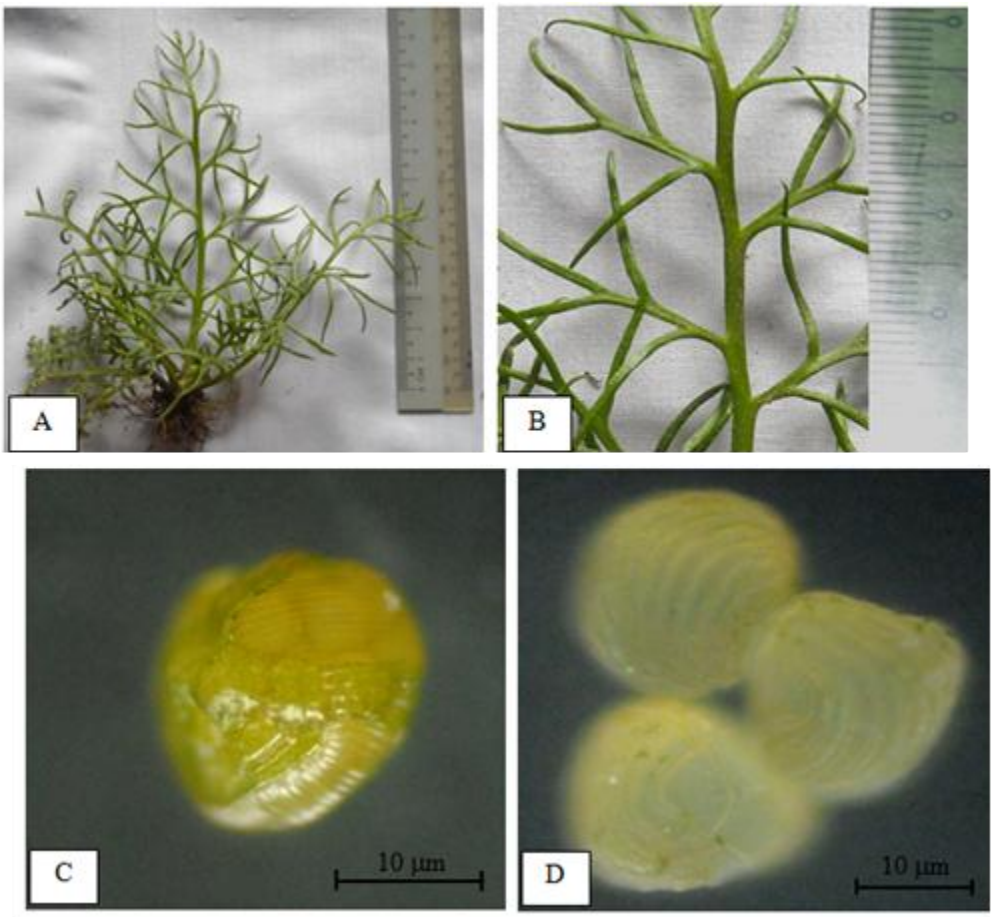

Figure 8 **A**. Habit , **B**. Frond with Sori, **C**. Sporangium, **D**. Spore of *Ceratopteris thalictroides* (L.)Brongn.

CONCLUSION

In the present study, 7 species of terrestrial and semi-aquatic ferns were reported. For the taxonomic identification of ferns, the sori on a given species of ferns always took on the same characteristic. They were usually arranged on the underside of a fertile frond, sometimes in straight lines, sometimes in curved lines, sometimes in circular clumps and sometimes in kidney shaped. Because there are a variety of arrangements of the sori and because the arrangement on each species was somewhat fixed, this characteristic was often used to identify.

According to the previous studies, Microlepia strigosa, and Lygodium microphyllum were recorded in Mon state, Yangon Division and Kyaikhtiyoe wildlife sanctuary (Toe Toe 1993, Cho Cho Myint 1995, Thin Yu Khaing 2007, Thet Yu New 2009). These species were found in Seinlone Mountain area.The five species, Lycopodiella cernua, Sellaginella plana, Lygodium salicifolium, Pteridium aquilinum and Ceratopteris thalictroides in the present study were not included in previous studies on Mon State, Katha and Indaw township of Sagaing Region and Kyaikhtiyoe Wildlife Sanctuary (Toe Toe 1993, Cho Cho Myint 1995, Thin Yu Khaing 2007, Thet Yu New 2009).

Although taxonomic study on angiosperm had been done by many researchers in Myanmarthe systematic study on ferns and fern allies are still rare to get the basic and applicable information in our country. The present result shows that the morphology distinct species of ferns are still distributing in Seinlone mountain area. Therefore the present study is one of the systematic records of ferns and fern allies to be used by various researchers in various field of study. This study fulfilled the required information of ferns and fern allies in Seinlone Mountain range which would partially accomplished the Ferns Flora of Southern Kachin State in Myanmar.

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